國立中央大學 106 學年度碩士班考試入學試題

所別： 土木工程學系 碩士班 運輸工程組(一般生)
土木工程學系 碩士班 運輸工程組(在職生)

科目： 運輸工程

本科考試可使用計算器，廠牌、功能不拘 ＊請在答案卷內作答

Note: You can write your answers in Chinese. For the first four problems, please write down your calculation procedures instead of answers only. Note that $g = 9.8$ m/sec^2.

Problem 1 (10%): A truck is traveling on a circular path of radius R = 150 m and superelevation e = 0.08. Assuming that the coefficient of side friction is 0.2, determine the maximum safe speed to avoid slipping.

Problem 2 (20%): Suppose the vehicular stream on a one-lane one-way highway follows the following relationship: s = 1/(80 - u), where s is the spacing of vehicles and u is the speed of vehicles. (s: km/veh, u: km/hr)

(a) (10%) Please find the free flow speed (u_f), the congested concentration (k_j), the maximum flow (q_{max}), the speed at the maximum flow (u_m) and the concentration at the maximum flow (k_m).

(b) (10%) If the vehicular stream on this highway is traveling at 50 km/hr and then interrupted by a broken truck for 10 minutes, please estimate how many stationary vehicles are accumulated in front of the broken truck at the end of 10 minutes.

Problem 3 (10%): A transit line employing nonarticulated vehicles is expected to carry 18000 passengers during the 2.5-hour morning peak period. Given an average vehicle occupancy of 80 passengers and a round-trip time of 48 minutes, calculate the hourly flow (q) and the number of vehicles (F) required to provide this flow.

Problem 4 (20%): The information of coordinated signals at intersections of a one-way street is shown in the following table.

Intersection	Green	Amber	Red	Offset	Distance from A
A	40s	5s	35s	0s	0m
B	45s	5s	30s	30s	400m
C	35s	5s	40s	15s	1000m

參考用

Assuming that vehicles travel at 36 km/hr, what is the through band?

Problem 5 (20%): Explain the following terms:
(a) (5%) sequential demand-forecasting process
(b) (5%) dilemma zone
(c) (5%) transportation planning
(d) (5%) airport gate assignment

Problem 6 (20%): Answer the following questions:
(a) (5%) What is economy of scale (EOS)? Show an example of high EOS transportation mode and a low EOS mode.
(b) (5%) What is functional classification of rural highways? Please interpret their characteristics in terms of mobility and accessibility.
(c) (5%) What are the typical ways that the government intervenes in the transportation system? Please show an example for each way.
(d) (5%) What are the advantages and disadvantages for a one-way street system?